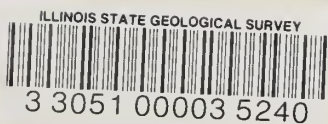
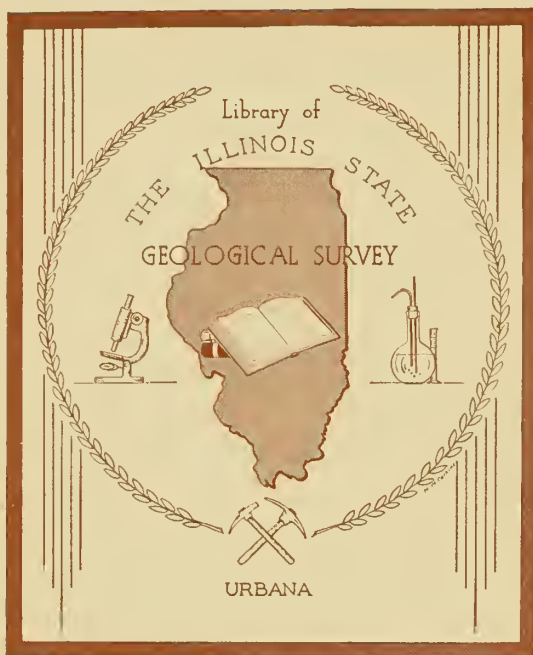



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CIRCULAR—NO. 116

THE STRUCTURE DIORAMA

BY
FREDERICK SQUIRES

REPRINTED FROM THE OIL AND GAS JOURNAL
VOL. 43, NO. 15, AUGUST 19, 1944



PRINTED BY AUTHORITY OF THE STATE OF ILLINOIS

URBANA, ILLINOIS
1944

The Structure Diorama

By Frederick Squires

SOME time ago the writer had occasion to investigate the Lawrence County, Illinois, oil-producing sands. These occur in five principal strata, but when the wells producing from all of them were shown together on one production map, the sand or sands from which each well was producing being named only on the well itself, considerable confusion arose as to the outline and extent of each single producing stratum.

Division Into Separate Sands

This confusion was obviated by making a separate map of each sand, and the five maps are here reproduced as Fig. 1. Fig. 2 is a block diagram showing a vertical section through the same sands. Each producing-sand area was then painted in a distinctive color on a separate sheet of glass, and the glass plates were then superimposed in a frame so that the vertical relation of each sand area would be plainly and accurately shown in relation to the others (Fig. 3). These, of course, were shown on separate horizontal planes and did not take structure into account.

Modeling With Colors

The next step was to try to show both structure and extent graphically. It is often important to illustrate deeply buried structures more clearly than is presented by contour maps. This effort was made with pigments. The structure contours on the McClosky "lime" were drawn and then each level was painted with a different color, the colors, by their differences in tone giving the effect of modeling. Although this presented a fairly good picture of the structure of the single sand, it had to be confined to one stratum at a time because paint is opaque and would obscure pictures of lower strata if other strata were superimposed.

Modeling With Nitrocellulose

A transparent model which would show superimposed strata was next attempted. A producing area with three different oil horizons was chosen and a peg model of the wells was made and built up with nitrocellulose plastic to the upper surface of the lowest stratum. Then this surface was marked with a grid, using a distinctive color, and more plastic was applied over it until the top of the next stratum had been modeled, on which a grid of a different color was made. The third stratum was finished in the same way. This gave a picture of three visible, superimposed, differently colored surfaces, each color grid located like a colored net frozen in a block of ice. But the plastic shrank on hardening and thereby destroyed the accuracy of the modeling, for which reason the method was abandoned in favor of the structure diorama described below.

Modeling With Glass Plates

Fig. 4 shows in plan and section the mechanics of the structure diorama. In the bottom of a plywood box were placed four fluorescent lamps connected to a wall plug for current and operated by switches mounted through the side of the box. Above them is a frame on which were placed sheets of glass, each inscribed in ascending order with a single contour of the structure which is to be shown in three dimensions. The interval between contours may be confined to the thickness of the glass plate or increased up to any greater distance by separating the plates by means of fillers of the desired thickness placed in the corners outside the contoured field. By varying the colors with which each set of contours is drawn, several horizons may be shown in the same diorama, the colors distinguishing each horizon from

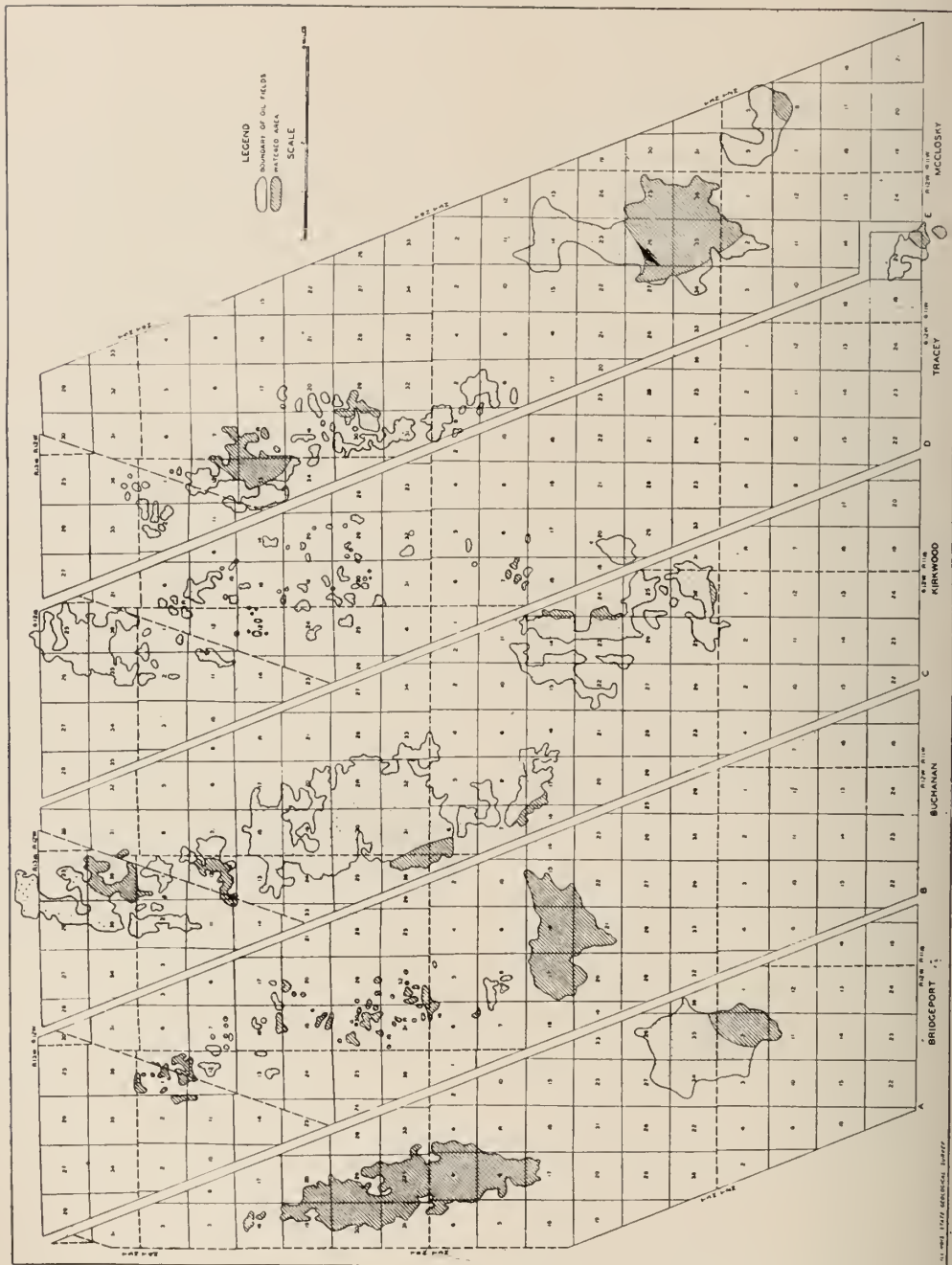
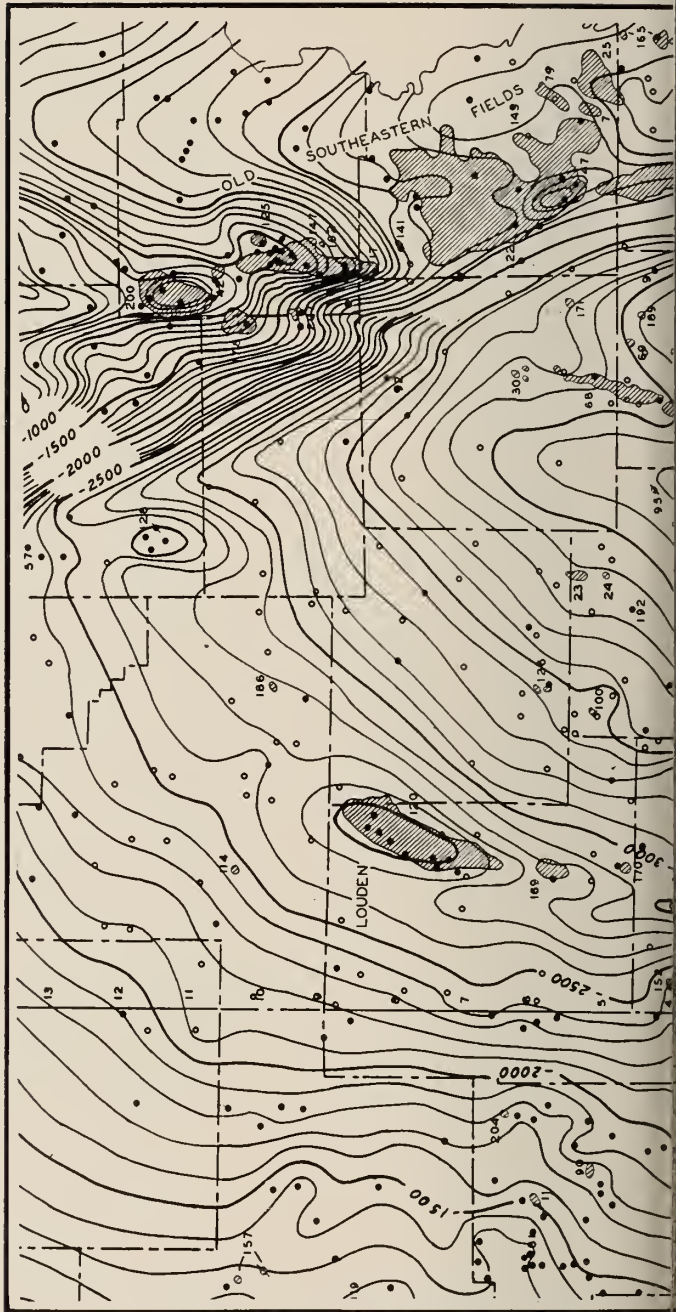




Fig. 2: This is a block drawing which illustrates the vertical relations of the various sands in the old Southeastern fields, and is a diagrammatic section through the sands shown in place in Fig. 1



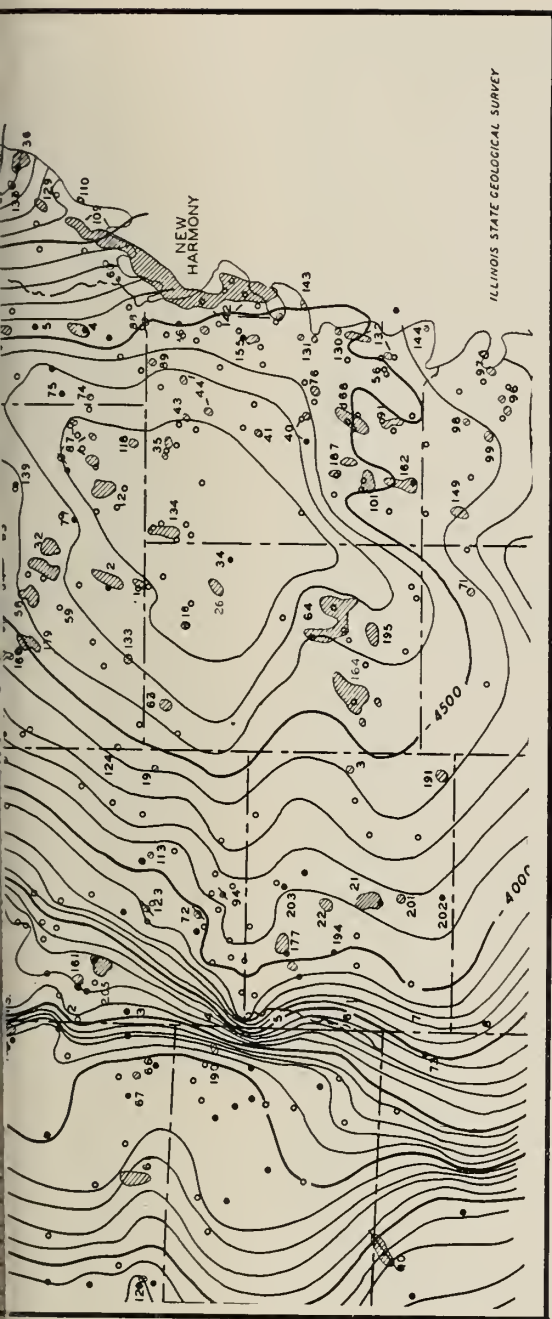


Fig. 6: This is a part of plate 1 published as part of Report of Investigations 92 by A. H. Bell. From it were taken the contours, each of which was drawn on a separate sheet of glass and all collected to form the structure diorama illustrated in Figs. 4 and 5. On Fig. 6 are shown the oil pools and geographical divisions which may also be shown on the structure diorama

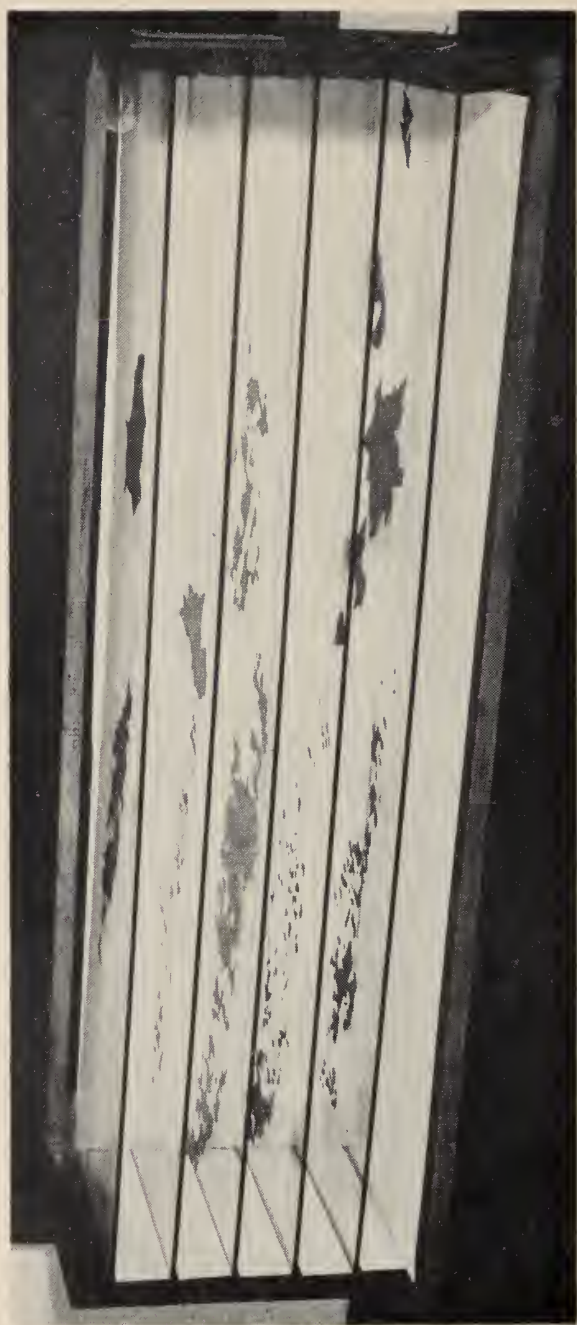


Fig. 3: This is a photograph of a model made of sheets of glass, on each of which is colored the areas covered by the production of a single sand. The plates are so arranged that the areas of sand are superimposed in accurate vertical relation. It is interesting to note the parallel axes of the west and east fields and the connecting link in the Buchanan and Kirkwood sands

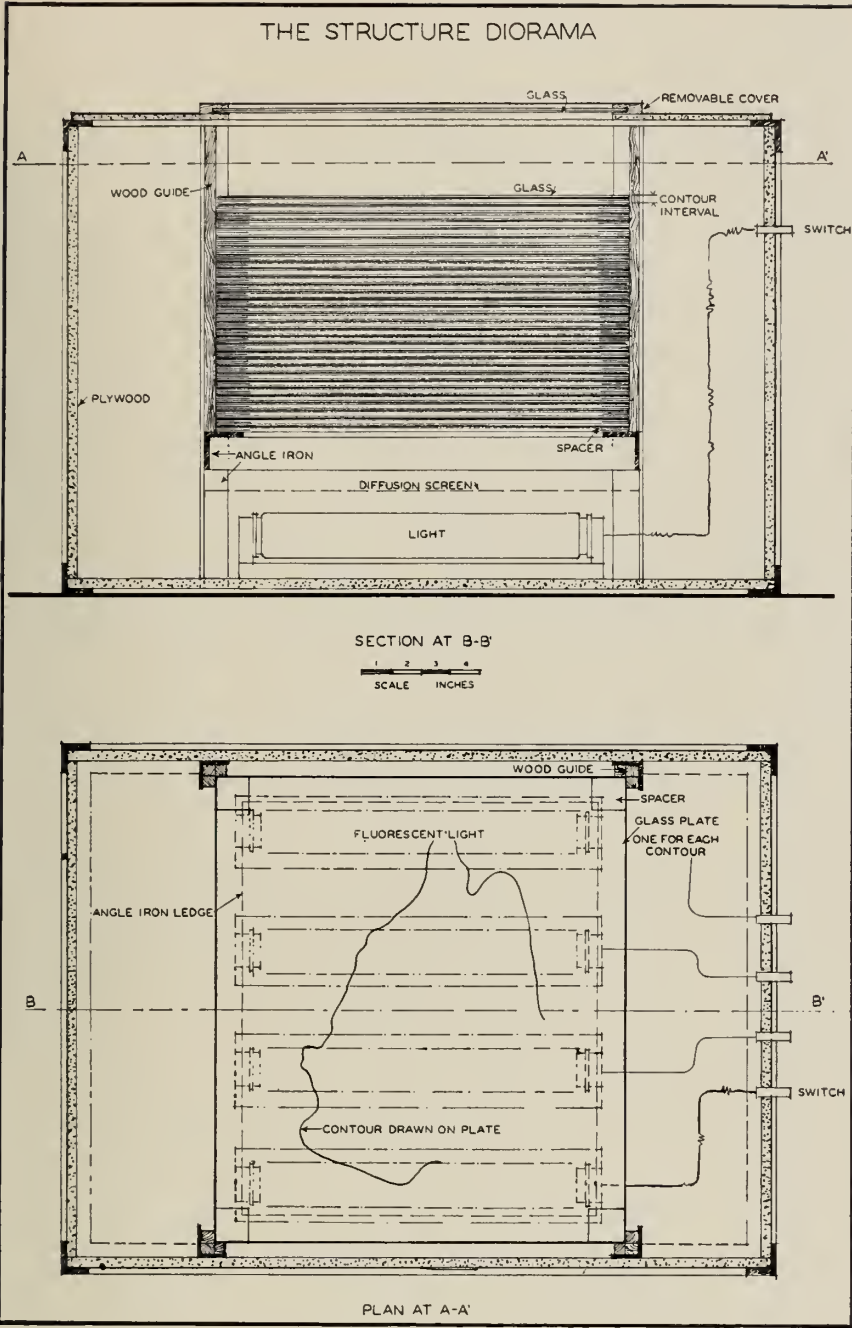


Fig. 4: This shows by section and plan the construction of the glass plate structural diorama. Plastic plates may be substituted for the glass plates. The plates may be placed directly on each other for the least possible relief or they may be separated by equal fillers of any thickness in order to increase the contour interval

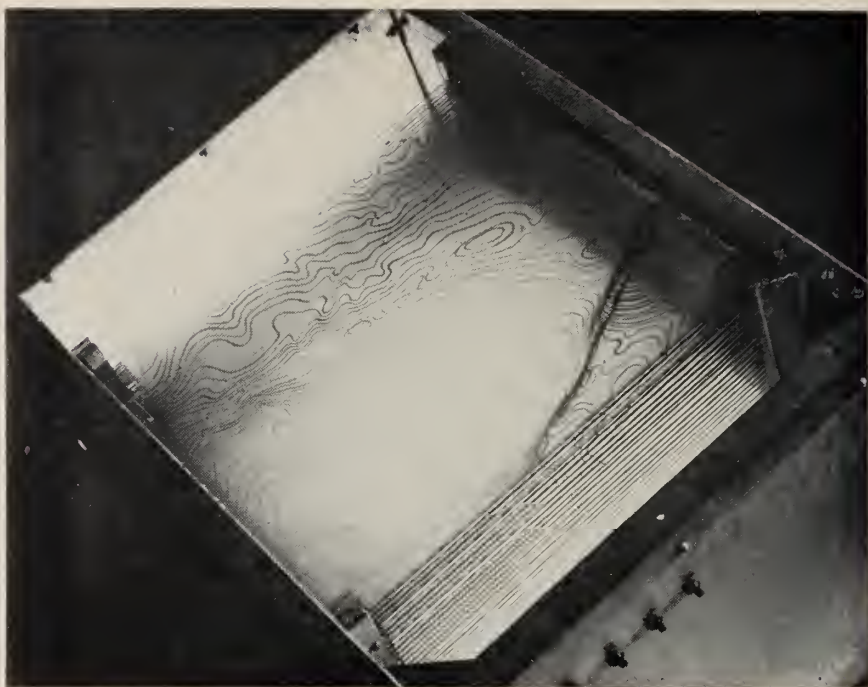


Fig. 5: This is a photograph of the completed structure diorama. Because of the very nature of photography, the picture in the absence of shades and shadows lessens the three dimensional aspect of the actual object. This illustrates, however, the importance of a method which provides a three dimensional impression

the others. The top plate is then marked to show divisions by counties, sections, etc., and may also be marked with the oil-productive areas.

In the completed structure diorama, vertical separation between any two horizons is apparent, also such phenomena as shift of axes in various horizons. The photograph (Fig. 5) illustrates a diorama of a single horizon taken from the contour map, Fig. 6. Transparent plates of plastic may be substituted for the glass plates. They are lighter in weight and less fragile.

Other Applications

It is, of course, easy to indicate vertical contours (sections) by distinctively colored dots on the horizontal contours located where the vertical plane cuts them. No doubt an arrangement of mirrors could be

devised to give similar results; also vertical planes of shadow cutting across the horizontal contours would produce vertical sections.

Another method of showing sections in vertical planes through the contours drawn on horizontal planes is the use, for each horizontal layer, of two or more abutting rectangles of glass. Sections drawn on the edges of these glass plates at their juncture with each other would result in vertical sections through the horizontal contours.

The thickness of a stratum, for example, a sand, may be pictured at all points by superimposing contours on the top of the sand over contours on the bottom of the sand.

Acknowledgments

The writer wishes to thank C. C. Boley, William H. Easton, A. H. Bell, Dorothy Rose, and A. W. Gotstein for help on this problem.

